PROBABILISTIC APPROACHES APPLIED TO NUMERICAL GEOMECHANICS

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ABSTRACT

Uncertainty is present in every engineering system. In geomechanics, it is especially important as we deal with natural materials, exhibiting spatial variability. In recent years, the probabilistic framework allowing to tackle this uncertainty quantification - therefore opening the door to sensitivity and reliability analyses - has gained popularity and can be now applied to assess probabilities of failure, risk, and help decision making in the geotechnical world [1]. In the meantime, the development of surrogate (or meta-) models has also permitted to couple these probabilistic approaches with time-consuming numerical analyses.

It is also interesting to note that during the development of the 2nd generation of Eurocode 7 [2], reliability-based design has been identified as one of the challenges - and possible alternative solutions to the partial factor approach - in order to better design geotechnical structures, for both ultimate and serviceability limit states.

This mini-symposium aims to present recent developments around uncertainty quantification, sensitivity and reliability analyses applied to the geotechnical world. Relevant topics include: random variables definition, data-driven site characterization, uncertainty in constitutive models, target reliability values, coupling of probabilistic approaches with nonlinear finite element computations, Bayesian analyses, reliability-based design optimization, and addressing spatial variability with random fields.

REFERENCES

[1] Phoon, K.-K., Shuku, T. and Ching, J., *Uncertainty, Modeling, and Decision Making in Geotechnics*, CRC Press, Taylor & Francis Group, 2023

[2] TC250/SC7/TG-C3, *Reliability-based methods for geotechnical design and assessment: guideline document for the next-generation Eurocodes*, Working draft, 2023